

Claims

1 1. An ignition actuation mechanism for a lighter for generating
2 discharge voltage that causes a spark of electrical current between
3 ignition electrodes to ignite fuel gas when an actuation member is
4 pressed including:

5 a first elastic member positioned to resist actuation movement
6 of the actuation member having:

7 a first spring rate; and

8 a second elastic member positioned in parallel with said first
9 elastic member to resist actuation movement of the actuation member
10 having:

11 a second spring rate higher than said first spring rate, said
12 second elastic member being positioned for engagement to resist
13 actuation movement of the actuation member only after more than half
14 of the actuation movement of said first elastic member, whereby the
15 effective spring rate to resist pressing movement of the actuation
16 member sharply increases during the ignition actuation.

1 2. The ignition actuation mechanism as defined in claim 1 including:

2 a piezoelectric mechanism for generating the discharge voltage
3 having:

4 an actuation end; and

5 the actuation member, said actuation member being slidably mounted
6 to operate said actuation end.

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1 3. The ignition actuation mechanism as defined in claim 1 wherein
2 said second elastic member engages to resist actuation movement of
3 the actuation member when 40% to 10% of the actuation movement remains.

1 4. The ignition actuation mechanism as defined in claim 3 wherein
2 the maximum force to resist the actuation operation caused by the
3 combined first and second spring rates is 30N to 50N.

1 5. The ignition actuation mechanism as defined in claim 2 wherein
2 said second elastic member engages to resist actuation movement of
3 the actuation member when 40% to 10% of the actuation movement remains.

1 6. The ignition actuation mechanism as defined in claim 5 wherein
2 the maximum force to resist the actuation operation caused by the
3 combined first and second spring rates is 30N to 50N.

4
5 7. The ignition actuation mechanism as defined in claim 2 wherein
6 said second elastic member includes:
7 torsion plates integrally formed with said actuation member.

1 8. The ignition actuation mechanism as defined in claim 7 wherein
2 said second elastic member includes:
3 torsion plates acting on said actuation member.

1 9. The ignition actuation mechanism as defined in claim 6 wherein
2 said actuation member and said torsion plates are integrally molded
3 from polyacetal resin.

1 10. The ignition actuation mechanism as defined in claim 8 further
2 including:

3 a holder member integrally formed with said second elastic member
4 and positioned separate from said actuation member during a early
5 portion of the actuation movement of said actuation member.

6
7 11. The ignition actuation mechanism as defined in claim 10 wherein
8 said holder member and said torsion plates are integrally molded
9 together from polyacetal resin.

1 12. A spark ignition actuation mechanism for a lighter to ignite
2 fuel gas when an actuation member is pressed including:

3 a first elastic member positioned to resist pressing movement
4 of the actuation member having:

5 a first spring rate; and

6 a second elastic member positioned to act in parallel with said
7 first elastic member to resist pressing movement of the actuation member
8 having:

9 a second spring rate higher than said first spring rate, said
10 second elastic member being positioned for engagement to resist pressing
11 movement of the actuation member after a first portion of the pressing
12 movement has occurred, whereby the effective spring rate to resist
13 pressing movement of the actuation member increases sharply during
14 a second later portion of the pressing movement.

1 13. The spark ignition actuation mechanism as defined in claim 12
2 including:

3 a piezoelectric mechanism for generating the spark having:
4 an actuation end; and

5 the actuation member, said actuation member being slidably mounted
6 to operate said actuation end.

1 14. The spark ignition actuation mechanism as defined in claim 13
2 wherein said second elastic member engages to resist actuation movement
3 of the actuation member when 40% to 10% of the actuation movement remains.

1 15. The spark ignition actuation mechanism as defined in claim 13
2 wherein the maximum force to resist the actuation operation caused
3 by the combined first and second spring rates is 30N to 50N.

1 16. The spark ignition actuation mechanism as defined in claim 13
2 wherein said first elastic member is positioned as part of said
3 piezoelectric mechanism.

1 17. The spark ignition actuation mechanism as defined in claim 12
2 wherein said second elastic member is at least one flexible finger
3 integrally formed with said actuation member.

1 18. The spark ignition actuation mechanism as defined in claim 17
2 wherein said actuation member and said flexible are integrally molded
3 from polyacetal resin.

1 19. The spark ignition actuation mechanism as defined in claim 12
2 wherein said second elastic member is at least one flexible finger
3 positioned for acting on said actuation member.

1 20. The spark ignition actuation mechanism as defined in claim 19
2 further including:
3 a holder member integrally formed with said second elastic member
4 and positioned separate from said actuation member during a early
5 portion of the actuation movement of said actuation member, wherein
6 said holder member and said at least one flexible finger are integrally
7 molded together from polyacetal resin.